

Martin (H. A.)

SURGICAL USES

OTHER THAN HÆMOSTATIC

OF THE

STRONG ELASTIC BANDAGE.

BY

HENRY A. MARTIN, M.D.,

BREVET LIEUT.-COLONEL AND LATE SURGEON U. S. ARMY.



Reprinted from the
Transactions of the American Medical Association for 1877.

"L'office du bon Medecin
Est de guarir la maladie
Que s'il ne vient à ceste fin
Au moins faut-il qu'il la pallie."
Canons et Regles d'AMBROISE PARÉ.

BOSTON:
JAMES CAMPBELL.
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SURGICAL USES OF THE STRONG ELASTIC BAND- AGE OTHER THAN HÆMOSTATIC.

ANNOUNCED as above, I made somewhat extended remarks, on the third day of the late Convention of the American Medical Association at Chicago.

So much interest, unusual and unexpected, was manifested in what I said, both at the time and ever since in very numerous letters of inquiry, that I gladly accede to the request contained in many of these, and also made by the Secretary of the Surgical Section, for a written abstract or *resumé* of my remarks.

The subject is one which has largely occupied my attention for a great many years. I have always been convinced of its importance, and always intended to communicate to the profession the results of my labor and observation in its investigation. Indeed it was because I considered the matter so very important that, although I have spoken of it freely to physicians, I have so long refrained from publishing anything about it. I did not wish to commit myself in print until I had accumulated such a mass of the results of experience and observation as should enable me to speak with decision and without doubt on every point, and such accumulation cannot be rapidly made by a private practitioner without any of the great facilities of an hospital appointment.

I regret, on all accounts, that this paper has not, for its author, some man whose name commands the attention of the profession. "Truth is mighty, and will prevail," I suppose, no matter who heralds her. It *may* be so perhaps, eventually, but I know from experience how slow even the enlightened world of the medical profession is to recognize Truth unless some great name announces her, and how, indeed, with such introduction, Folly and gross outrageous Error pass for her.

It is so very easy, however, for any one to test the truth of what I shall write—for the world is full of uncured ulcers and the other troubles for which I recommend a certain treatment—that I cannot help hoping, even against experience, that my readers, however eminent, will not criticize me unfavorably till they have fully tested, as they can so easily do, the method I shall describe.

I call the bandage "the strong elastic bandage," and not Esmarch's, which it much resembles, because I was making almost daily use of it very many years before Esmarch made the discovery and published the great improvement in practice which has immortalized an already illustrious name. I make no claim whatever to Esmarch's discovery, although very many years ago I twice made suggestions to surgeons, about to amputate legs, which, if regarded, might have led to that discovery. The suggestions, however, were *not* regarded, I being at the time a "young physician." Indeed, I felt *theoretically* sure that such a bandage could not arrest the deep arterial circulation in a limb, so *sure* that I never took one of my bandages to try the simple experiment which would have developed the very important discovery that it easily *can* and *does* arrest it. The history of our art is largely a history of being satisfied with nice theories, and shirking the simple practical experiments which, when made, fill the world with wonder that they were not made long before.¹

¹ I think that I am familiar with the uses hitherto made of India-rubber in surgery, and correct in supposing that most of the suggestions contained in this paper are original with myself. If mistaken, I am open to correction. The only publication of which I have knowledge in which strong rubber bandages are commended for the cure of ulcers of the leg, is a very brief paper in the *London Practitioner* for May, 1876, giving an account of the very rapid and satisfactory cure of six and probable cure of a seventh ulcer of the leg by the use of Esmarch's bandage in a way quite different from mine. The writer is Dr. S. D. Turney, of Circleville, Ohio, and the paper a very interesting and important one, although so little noticed even by the editor of the *Practitioner* as to be entitled, by an absurd error or oversight, "Use of blisters in chronic ulcers." Dr. Turney's method is to apply Esmarch's bandage very tightly, "as long as it could be borne" " (about ten or fifteen minutes)," once a day, till cure is effected. His first case must have been a most unfavorable one, an old woman (85 years) with a "chironian ulcer" on the ankle which had resisted the treatment, for fifteen years, of several physicians, Dr. Turney included. In less than four weeks she is reported as perfectly cured, cicatrization firm. The report of the case was published two years after the cure, during which the cicatrix had endured and "resisted a severe attack of eczema." Dr. Turney's paper is in my estimation very important and suggestive. I take pleasure in calling attention to it. In a

I hope that the following papers may answer intelligibly the requirements of the profession. If any point seems obscure to any of my readers, or information is desired on any point not treated in it, I shall be most happy to clear up the obscurity or afford the desired information, if in my power, in answer to a request to that effect.

Treatment of Ulcers of the Leg by the Strong Elastic Bandage.—For over twenty years I have, with unvarying success, treated all forms of ulcer of the leg by the application of a bandage of what is technically known as “pure rubber.” The length of this bandage is ten and a half feet, width three inches, and thickness of No. twenty-one of “Stubs’ wire gauge.” Into one end, two or three inches of strong linen cloth is inserted, and to this is strongly sewed a stout double tape eighteen inches long. It is important that the edges of the bandage should be perfectly even. If there is the slightest notch in them, the bandage will be very apt to tear at that point, and become useless. If, however, it be properly cut, it will bear almost any amount of continued traction. This even cutting of the bandage can only be done properly by machinery. When I began to experiment in this method of treatment I attempted to cut the bandages from the sheet rubber with strong sharp shears, but I found it impossible to cut them with sufficient accuracy. All my bandages are now, with the exception of attaching the tapes, made at the India rubber factory in my neighborhood. It is astonishing how long a properly made bandage will wear. Many of my patients are wearing them every day, and have done so for two, three, even four years, and I have cured several successive poor patients’ ulcers with a single bandage which is still perfectly serviceable. To insure this durability the material must be the best Para rubber, prepared with the minimum of sulphur and heat needed to effect that “curing” of the gum, without which it would very soon deteriorate and become worthless. The dimensions given are those which I have found most generally applicable. If a leg is *very* long and large, an addition of two or three feet in length, and of half an inch in width, may be desirable. In a few

bad case of indolent hard-edged ulcer, I should certainly practise this method *pari passu* with my own, *i. e.*, tight application of bandage for a few minutes each day, and gentle continued pressure for the rest of the twenty-four hours.

cases, where a varicose condition of the veins of the thigh accompanies the ulcer or ulcers on the leg, I apply a bandage from the foot to the groin; this must be from eighteen to twenty-one feet long, and, if the limb is very large, a width of three and a half or even three and three-quarters inches may be requisite. If the leg is very slender, there will be somewhat more bandage than is necessary; this, however, can be wound round below the knee, or, of course, cut off to suit the exact requirements of the case. After being in use for a short time the bandages improve in appearance by getting rid of the sulphur which, to use a technical phrase, "sweats out" of the rubber. This sulphur is not at all objectionable except in appearance; indeed I think I am not fanciful in believing that, in certain conditions of the skin, it exercises a decidedly beneficial effect. The sulphur could be removed and a much nicer looking bandage produced, but this could only be done by certain chemicals which would probably injure the rubber. Now and then I use a bandage for a child or even infant, and, of course, a narrower and shorter *but not thinner* one is needed. For diseases and injuries of and about the joints, bandages of very varying length, and generally wider and of greater thickness, are required, according to the amount of support and resistance to the undue motion of the joint which is sought after. I have described the bandage rather minutely, perhaps, for so very simple a matter; but I am anxious that surgeons who test the merit of the practice I commend should do so fairly, and that there should be no room for mistake. One word more, the thickness is what I have found after many variations and trials to be exactly right. If thinner, it would not fulfil desired ends, and if thicker it would be unnecessarily clumsy and heavy, and much more apt to slip down unless a degree of traction should be made and pressure applied to the leg beyond what is desirable.

I need not detail the steps by which I arrived at the knowledge that no other application except of such a bandage is needed for the treatment of all ulcers of the leg of a non-specific character which are at all in the category of curable by any method, while many not really curable by other treatment have been found to yield easily and perfectly to this. I first used the rubber bandage as a substitute for the "roller," usually applied over Baynton's strapping. I soon dropped the strapping and substituted various salves and lotions. At last I discovered that the band-

age alone is all that is requisite, and that without the slightest interruption of the patient's business or way of life, without the necessity of an hour's rest or change of position. Indeed, during the whole time that the patient wears the bandage till the complete cicatrization of the ulcer, he is much more comfortable and able to work or exercise than before its application. If not a means of cure, the strong elastic bandage would be very valuable as a palliative, particularly in that very large class of ulcers complicated with a varicose condition of the veins.

When it is considered how very large a proportion of cases of ulcer of the leg occur among hard-working people, dependent on daily labor for daily bread, how impossible to successfully treat many of them without rest and recumbent position, and how out of the question it generally is for such patients to take the time needed for treatment, it seems to me that the value of the simple method I propose cannot easily be overestimated.

The form of ulcer which yields most perfectly and readily to this treatment is that very common one connected with a varicose state of the superficial veins. It is well known how unsatisfactory all previous methods have been in this class of cases, how next to impossible to obtain firm sound cicatrization of such ulcers without a very long continuance of the horizontal position, and how extremely liable they are to return, at the slightest provocation, when the erect position is resumed. The ulcers found on old poorly nourished legs, where there is a deficiency in the quality or quantity (generally both) of the blood, a feeble heart, imperfect circulation, and, consequently, a wretchedly nourished skin—those which were called chironian ulcers by the ancients, deemed by them incurable, or curable only by the Centaur Chiron, or one his professional equal; round or approaching round, with perpendicular sides, as if cut with a punch through the much thickened skin, with white, hard, almost cartilaginous edges—yield the least readily, but still are healed by this method more speedily and much more solidly and enduringly than by any other.

I need occupy but little space in describing my way of using the bandage, for nothing can well be simpler. The patient is directed to put it on the first thing in the morning, before the veins of the leg become distended by the impeded column of blood within them. The very best way is to apply it while still in bed. It should be applied with just snugness enough not to

slip down. The moment after the foot is put to the ground, the limb is so increased in bulk by the increase of blood in its veins, that the bandage becomes of precisely the proper degree of tightness, and, no matter how active the exercise or labor of the patient, it will remain in position all day. The bandage is applied by winding one turn just above the malleoli, then one round the instep and sole, then up the leg, spirally, round and round, to the knee, each turn overlapping that below it, from one-half to three-quarters of an inch. If there is any redundant bandage, it can be wound round the leg below the knee, the tapes carried in different directions and firmly tied. When the patient undresses at night, the bandage is to be removed, and the limb wiped dry; a piece of soft old linen moistened with olive oil, or some equally simple dressing, laid on the ulcer and retained in place by a few turns of an ordinary roller. The bandage should be sponged with water (cold will do, but warm is better), and hung over a line to dry, in readiness for the morning; or it can be wiped dry at once, and rolled up with the tapes in the centre. Such is the dressing for the night; in the morning the leg can be washed, but, whether it is or not, all traces of oil or cerate should be carefully wiped away, as contact with the bandage of any fatty matter would tend gradually to injure the rubber.

This is the whole treatment. Rubber bandage all day, with erect position and exercise. The simplest possible dressing (merely to protect the ulcer from injury), with the horizontal position and rest all night. When the bandage is removed at night, it and the leg will be found to be bathed in moisture. That part of the limb to which the bandage was applied has been all day kept warm, moist, and perfectly excluded from the air, in an atmosphere and conditions the most favorable possible for the processes of granulation and cicatrization. In addition to this, a gentle, continually maintained, and even pressure has supported the distended and weakened vascular coats, and prevented that venous turgescence which is the cause, in many ulcers, of mal-nutrition of the skin, the sole reason why nature's ordinary processes of repair are impeded and prevented. In those cases where no varicose condition of the veins exists, but in which an imperfect and feeble nutrition of the skin is the *raison d'être* of the ulcer, where nature is unable to heal the slightest scratch, and the most trivial contusion rapidly changes into an indolent ulcer, with white, elevated, leathery edges, the bandage, by the warmth and moist-

ure induced by its application, favors the circulation in the capillary vessels, and a determination of blood to the surface. The constant pressure is at once a stimulus to the process of granulation, and to the rapid absorption of the hard edges, the removal of which, in some way, is a necessary antecedent to cicatrization. During the first week or two, and in a few cases for even nearly three weeks, an eruption appears under the bandage, sometimes of few, sometimes of many papules, running very rapidly into suppuration. Each of these indicates an obstruction in one of the cutaneous follicles. The bandage is their best possible treatment, for the moisture softens the indurated secretion, washes it away, or favors the rapid suppuration by which nature accomplishes the same object, and, in a very short time, the skin of the leg, subjected to a daily and all-day Turkish bath, becomes entirely clear of all obstruction, and so continues, however long the bandage may be worn. Often, ulcerated legs evince other evidence of mal-nutrition of the skin. Without enumerating or classifying these, all I need say is, that all, however diversely named in the terminology of that great science of words, dermatology, are more or less decidedly benefited by the bandage.

I think what I have written will afford a sufficiently practical notion of the method of treatment by the strong elastic bandage. During the past twenty-five years, I must have treated at least from six to seven hundred cases of ulcers of the leg in this manner, and all, without exception, have been perfectly and absolutely cured. I do not include cases of syphilitic or scrofulous ulceration. Although often a very useful adjunct to treatment in such cases, the bandage alone is not sufficient. Of course, now and then, some other treatment is advisable, if not absolutely necessary, as, for instance, measures to obviate constipation, washing with a strong suds of tar soap, bathing with more or less dilute carbolized washes when the skin is extremely itchy, etc.

As I am writing for physicians I need not describe the general treatment of these cases. The great aggregate of cases which I have treated by this method during so many years includes every variety of ulcer commonly seen. In the first one to two hundred cases, I employed other treatment with the bandage, but, for the last fifteen years, I have constantly used the bandage alone in all ordinary non-specific ulcers, and with the most gratifying and complete success. I repeat this, for I wish to impress the reader

with something of my own estimate of the value of the method. My custom is, when a patient comes from a distance, to apply the bandage, give the directions as indicated above, and tell him or her, if the ulcer is not well in one month, or evidently getting well very rapidly, to come again and get any further advice that may be necessary *gratis*. In not a single instance have I ever seen one of these patients again, *as a patient*; now and then one returns with a friend to report himself well, and to bring his friend for treatment. In this way, and principally from the large manufacturing towns and cities, have I treated so large an aggregate of cases. Patients who stand all day at the loom become very liable, at and after mid age, to ulcer of the leg, very often a *sequela* of a long continued varicose condition of the veins, and, consequently, I have had a great many patients from the great woollen mills at Lawrence and elsewhere.

An apprehension has often been expressed by physicians, of œdema of the foot, as a consequence of applying the elastic bandage as I have directed. Such apprehensions are needless. It is a fact, and illustrates the manner in which this method proves so efficient, that a properly applied bandage of this sort does not produce œdema of the foot. If œdema appears, it is because the bandage is on too tightly; applied with the degree of closeness I have indicated, it does not *stop* the circulation in the veins, but, by supporting the walls of the distended tortuous vessels, facilitates the passage of the blood through them, and, in this way, not only does *not* produce œdema, but rapidly removes that which often, to a certain degree, complicates ulcer of the leg.

Another and very important point is that of wearing the bandage *after* an ulcer is quite well, as a preventive of its return; many of my patients do this continually by preference, even when not directed to do so. I advise all whose occupation tends to aggravate a varicose condition of the leg to wear the bandage while standing, both for the palliation of the symptoms of the varicose veins and as a preventive of the return of ulcer. Other patients are directed to wear the bandage when obliged to be much on the feet, or if there is the slightest irritability or redness at the seat of former ulceration, indicating a possible tendency to breaking down of cicatricial tissue. This is a most important point. The surgeon must bear in mind the tendency of cicatrices to break down from slight causes, and, particularly, where there is a diseased condition of the veins;

and instruct his patient to have his bandage always ready and in good order to be applied at once if needed. The cicatrization of ulcers under the rubber bandage is much firmer and better than, as a rule, I have observed to result from other treatment, but, of course, is not exempt from the tendencies and infirmities of all such tissue.

In conclusion of this part of my paper, and to illustrate what I have already written, I will briefly narrate four cases, one of pure varicose ulcer, one of hard-edged "chironian" ulcer, one ulcer complicated with phlebitis, a sequela (of twenty five years' endurance) of typhus ("ship") fever, and a fourth of unfavorable condition of a large incised wound following removal of tumor.

CASE I.—In the early days of my practice, nearly thirty years since, I had a patient, a man of about thirty, very tall, and somewhat corpulent. His business was to drive a wagon, with meat, to supply the poorer classes at their residences. This business kept him almost continually on his feet, and was particularly obnoxious to him, for he suffered from an extremely varicose condition of the veins of both legs. This was associated with one or more ulcers on each leg. He would, from time to time, be obliged to give up his business and submit to treatment. Over and over again he came under my care, and over and over again he went through the usual routine of Baynton's straps, roller-bandage, horizontal position, iodine, arg. nit., etc. etc. At last he became a proficient in the application of the bandage, and so familiar with the treatment of ulcers of the leg that he took his case into his own charge and ceased to send for me. When I began to use the elastic bandage I tried to find this patient, but he had gone from my neighborhood and for many years I did not see him. Some fifteen years since he appeared at my office, exhibited his legs, their veins larger and more tortuous than ever—the saphena vein in each thigh being certainly three-quarters of an inch in diameter from the knee to the saphenous opening. The legs below the knee were scarred by very numerous cicatrices of old ulceration on one, and on the other two ulcers remained unhealed. I told him how glad I was to see him, and all about the bandages, and applied one three and three-quarter inches wide and twenty-one feet long to each limb, extending from the ankle to the groin. After these were applied, he walked about my office and expressed his satisfaction with the immediate effect in relieving an aching pain, and a hope that now he was to be

cured. In three or four days, however, he returned, bearing in his hand the two bandages, and saying, "It's no use, Doctor, I can't wear them." I found that his was one of those rare cases (I have seen but three or four, and this was the only one of ulcer, the others were of trouble of the knee joint) in which the bandage irritated or "chafed" the skin, *i. e.*, macerated and removed the outer layer of epidermis and left the sensitive surface of the true skin too slightly protected. I told him not to give up without another trial; that if he could not use the bandages, there was nothing to do but to return to the strapping, etc., with which he was so familiar. He had attained perfect skill in applying linen bandages, one of which he then had on each leg. I simply applied the elastic bandages over these, and told him to persevere. In a week or so he came to my office and requested me to let him have two pairs more of the bandages. He said nothing could be more satisfactory: the relief of pain was perfect, although he was daily and all day long on his feet. The ulcers were already giving the most favorable indications of healing. I asked him why he need get four more bandages. I told him that those he had would last for three or four years with care, and he could always get new ones from me. He said, "Something might happen to you, Doctor; you might move away and I not be able to get them, and I would not be without them for ten thousand dollars." I have never seen this man since as a patient, but from time to time have met him in the street. His legs are quite free from ulceration, and have remained so since the elastic bandages were first applied. He wears them on both legs every day, as a means of palliation of the symptom from varicose veins and of prevention of return of ulceration.

CASE II.—That of old indolent gristly edged ulcer was one of the very worst I ever saw. The man was prematurely old, poor, badly nourished. The ulcer was round and about one-half larger than a silver dollar. In every respect it was a typical specimen of the "Chironian ulcer." The patient had been, for over nine years, almost constantly under treatment, as out-patient of hospitals, dispensaries, and also of private practitioners. The ulcer had several times been nominally healed, but had invariably reopened in a very few weeks after he returned to labor. This was a perfect test case. I treated it with the bandage only. In four months the ulcer was firmly and perfectly cicatrized. I might undoubtedly have hurried on the cure of this case by

removing the thickened edges by caustic or the knife, but preferred to depend on the bandage alone. This patient was directed to wear cotton drawers, but as there was no disease of the veins, was told that he need not wear the bandage after the ulcer was closed unless there should be signs of approaching trouble at the site of the ulcer. He has now for almost five years continued perfectly well without resuming the bandage.

CASE III.—The third case I shall mention was a very marked one. The patient was a very intelligent man, an apothecary, with sufficient knowledge, the "little learning" of the poet, to treat his own case. I had repeatedly urged him to use the bandage, but he was theoretically so sure that it would not "agree with his skin" that he never followed my recommendation. His ulcer resulted from disease of the superficial veins and capillaries about one ankle, consequent on phlebitis of the internal saphena vein, following, with much other serious trouble, a very severe attack of "ship" fever some twenty-four or -five years before his ulcer came under my charge. It was in the very worst possible place for an ulcer to be, so near the joint that any unusual exercise excited inflammation, and a breaking down of cicatricial tissue. A space twice the area of a dollar piece was composed of the cicatrices of repeated limited ulcerations. Some of this was good firm cicatrix, but a large part of it looked as if a very slight degree of inflammatory action would result in its destruction, and such was its history for all those years, repeated reopening and repeated imperfect flimsy cicatrization, as a result of "strapping," application of argentic nitrate, iodine, and the linen bandage, which the patient had learned to apply with exquisite neatness and celerity. My directions to him had been, as he would not use my bandage, to keep the leg in a horizontal position, and use the plaster and bandage as soon as the slightest indication of trouble with the veins was manifested. At last, exigencies of business absolutely required his active exercise, in the way of walking, for over a fortnight after he was warned of trouble along the whole course of the saphena vein, and by a rapid reopening of the ulcer. When I was called to him the entire main trunk of the vein was corded and tender. The cicatrices of former ulcerations had all entirely disappeared; their place was occupied by an ulcer. I drew from my pocket a rubber bandage, and, in answer to his urgent and repeated assurances that he knew he could not bear it, told him that I would have

nothing to do with the case unless allowed to treat it as I saw fit, and also that if he wished the bandage taken off after twenty-four hours' application, I would consent to its removal. I applied it, from the foot to the groin, with a view not only to the cure of the ulcer, but also of the phlebotic condition. On my visit the next day, I found him full of gratification at the result. He had experienced almost immediate relief from pain in the limb, and more comfort than for several weeks; had slept all night, etc. This case improved with great rapidity, and in a little over three weeks the entire field of ulceration was covered by a firm sound cicatrix. He has had no trouble since (nearly three years), no return of the ulceration nor of the tendency to phlebitis, the starting point of which was invariably inflammation at the seat of the ulcer. The only precaution he has taken has been to put on the bandage when obliged to be much on the feet. He has become its ardent practical advocate, as he was formerly theoretically opposed to its use, in his own case at any rate, and has sent me several patients to be treated for ulcers and varicose veins of the leg.

CASE IV.—This was the case of a girl of about ten years, unusually fat and *very* well nourished. Shortly after birth a tumor was noticed on one leg; it gradually increased until, when I first saw her, it extended over two-thirds of the space from the popliteus to the heel, doubling the size of the leg. The case had been seen by other surgeons who had diagnosticated a fatty tumor. My diagnosis was that it was polycystic, and so it proved. The tumor was composed of an immense multitude of round cysts, from those of microscopical minuteness to the size of a cherry. In one sense, it *was* a fatty tumor, but of cellular tissue remarkably metamorphosed. It was very difficult to remove the entire mass, for there was no distinct capsule, and after three pairs of young eyes had decided all the cysts to be removed, a pair of *old* ones, aided by a strong glass, discovered several score of very small ones scattered about in the cellular tissue. It was absolutely necessary to make a long incision (of three-fourths the length of the whole leg). This wound did very well, except that the cicatrization of the skin was not satisfactorily completed, the entire line of incision became the seat of a troublesome ulcerative action, and the leg was gradually covered by an impetiginous eruption. I tried all sorts of washes and other applications, but they did no good; the leg had now, for two months after it had got nearly well, been in this uncomfortable state, annoying me, and,

of course, exciting the apprehensions of the parents; I thought of the bandage, it was applied without any other treatment, and, in less than a fortnight, the leg was perfectly well.

Use of the Elastic Bandage in Injuries and Disease of the Joints, particularly of the knee and ankle.—Next to its utility in cases of ulcer of the leg, I consider the elastic bandage of great advantage in certain injuries and diseased conditions involving the joints, and particularly the knee and ankle. The cases usually called sprain or subluxation of a joint, consisting mainly of injury or even rupture of one or more of its ligaments, give a great deal of trouble to patients, and very often lead to serious and destructive disease. The ordinary treatment by liniments, anodyne, stimulant, corroborative, etc., is certainly not very fertile in brilliant results, and, in a very large proportion of cases, is the most irrational and fruitless treatment possible. How rubbing the outside of a joint with any liniment, or painting it with tincture of iodine of any strength, can in any way strengthen a joint, or repair an injured or broken ligament, is very difficult to conceive. The end to be attained, if possible, is rest to the injured part till nature can restore it. The method of applying splint and bandage, or, better still, a plaster or starch bandage, by which the joint is fixed and kept from motion, *does* attain this, and at a great price, in loss of time and exercise, and is very apt to lead to a very decided stiffening, sometimes to a degree permanently impairing the usefulness of the articulation and nearly approaching ankylosis. The joint is also weakened through want of exercise, by an atrophy of its ligaments and of the muscles of the limb from disuse. The strong elastic bandage wound round a joint affords a constantly present substitute, externally, for the ligament or ligaments temporarily disabled. The constant pressure induces a rapid absorption of exudation among the tissues about the seat of injury, and the gentle equable warmth and moisture, which always accompany its application, have a most favorable effect in alleviating and preventing inflammation. The great advantage of the elastic bandage in these cases is best seen *after* their most acute stage, but I now always apply such a bandage soon after injury and often it is the first and only application. The judgment of the surgeon must be exercised in the application of this as of all other remedies, but it may be emphatically asserted that in all cases of sprain of the knee and ankle, after the

first most acute symptoms have subsided, and in a very large proportion of cases as the first and only treatment the bandage will be found to afford results quite unapproached by any other mode of treatment. I not only permit patients, suffering from injury or weakness of the knee or ankle resulting from previous disease, to take exercise, but urge them to do so, as a means of restoring the injured joint to its original strength. The one thing to be borne in mind is that the bandage is a temporary substitute for the injured ligament or ligaments; to take the place of these, and so permit them to have that undisturbed rest which is absolutely essential to their perfect repair. The application of the bandage must, therefore, be so made as to support the joint in such a way as to prevent motion, to an extent or in a direction which would apply extension to the injured ligaments. There is some difficulty in explaining in words the exact way in which the application of the elastic bandage is best made to a knee or ankle, one or more of the ligaments of which are elongated, weakened, or sensitive from disease or injury, but a single application in such a case will make all this clear to the practitioner if he has any just idea of the true indications of treatment. Take, for instance, a "sprained" ankle. There is a want of strength and control of the joint; it is very easily "turned," to use the common phrase, in the direction in which it was thrown by the original injury. This turning of the ankle, if extreme, violently extends the ligaments already injured, increases their sensitiveness, stretches and weakens them still more, and possibly even completely ruptures tissues which, before, had been only strained. The bandage, one, two, three, or more turns of which surround the joint, affords a firm, strong, constantly resisting and resilient force to prevent extreme distortion, and still permitting the natural motion of the joint to a sufficient degree. That lateral motion which does not exist at all, or only to a very limited extent, in a healthy ankle, and is only rendered possible by the rupture or stretching of certain ligaments, is prevented or sufficiently limited. Injury has weakened or broken the strong bands which bind the bones together and limit motion in a certain direction beyond a certain point. Art must supply a means to replace, for a time, these injured structures. The elastic bandage does this in the best possible way. Its employment does not involve entire immobility and uselessness of the joint, does not involve the danger of weakening it from disuse, nor of an-

chylosis or an approach to it from continued and entire fixation. Its use affords other advantages, to which I have already alluded, in the absorption of interstitial exudations, in the diminution of congestion and inflammation by the gentle constant equable pressure, and by the profuse sweating and constant warmth always induced by its application. These last effects are precisely those of a poultice and useful for similar reasons, but in a way and to a degree far superior to any possible poultice, as will be most evident to any careful observer after a very limited amount of practical observation. Sometimes the foot can be moved freely and painlessly in any direction but one. It will be found that, perhaps, one little ligament binding one of the tarsal bones to one of the metatarsus is injured, any motion of the foot is painless but that particular motion which exercises traction on that one little ligament. I know no way but by the use of the strong elastic bandage that such a case can be successfully treated without a fixed apparatus. I have treated many cases of sprain or subluxation of the knee and ankle as I have indicated with perfect and speedy success.

In many cases of disease and injury of the knee and elbow, and also of other joints, but chiefly of these, there is an increase of effusion in the synovial sacs. In recent cases I have found the bandage *alone* to be sufficient to promote its rapid absorption. In cases of long continuance, if the increase of synovia is slight, I have also succeeded without other treatment; but in chronic cases, with a considerable amount of effusion, I have been lately almost always in the habit of aspirating the synovial sac before applying the bandage: and I have never known a case in which this was done in which the effusion returned. I have never known a case where such a joint was "aspirated" and no such support afterwards applied in which effusion *did not return*, whether the synovitis was the result of injury or of disease. The synovitis following rheumatism of a chronic character, I have never seen at all benefited by the entire *apparatus* of iodine "paint," blistering, cupping, leeching, etc. I have treated several such cases by aspiration and the subsequent constant use (night and day) of the bandage for at least six weeks, and with complete success.

I think my readers can apprehend, from what I have written, my views of the *rationale* of the treatment of injuries and certain diseased conditions of the joints by the strong elastic bandage; if so, my object is attained. I will narrate briefly two cases, one

of disease, the other of a result of injury, both of the knee-joint, to illustrate what I have written.

CASE V.—A lady, the wife (now widow) of a most distinguished and heroic officer of our navy, wrote me from Portsmouth, N. H., that she had heard from a lady friend of her perfect relief at once, and cure in a few weeks of a lame knee, which had been treated persistently for over two years quite ineffectually by the usual methods. This cure, she had been informed, was by a bandage applied by me. She wished to appoint a time for meeting me, to ascertain whether her knee, which had for several years resisted the most varied treatment, might perhaps be capable of relief by the same means. In due time she came to see me, was lifted out of a carriage by the coachman, and, with the same assistance, limped painfully to my door. She had sprained one knee nearly four years before, and had suffered lameness and pain in the joint, which had slowly but steadily increased until now she was rendered almost helpless, and suffered extremely. The knee was not painful on pressure, but motion beyond a very limited extent was extremely painful. The synovial sac was enlarged, extended much beyond its natural limits, and could be felt and seen forming a sort of tumor in front of the upper end of the tibia. It formed a flaccid sort of bag, which had evidently at one time contained a much greater amount of effusion; this had distended the sac, had been to a great extent absorbed, and, as a consequence, this flaccid sac, stretched ligaments, and a painful weakened joint. All I prescribed was a strong rubber bandage wound several times about the joint in such a way as to fulfil the indications I have already sufficiently defined. In two months a carriage drove to my house, a lady jumped briskly out and ran up to my front door. She had called, she said, to tell and show me how perfect a result had followed the simple treatment I had recommended, and, seeing me sitting at my parlor window, had been more demonstrative of her agility than she might otherwise have deemed necessary. This lady had been continually under treatment from the time of injury till I saw her, the treatment not of quacks and bonesetters, but the regular accepted routine practice of the regular accepted routine profession, and all without the slightest benefit that she or anybody else could discover, but, on the contrary, with evident injury to her general health and an *apparent* aggravation and increase of local trouble and infirmity.

CASE VI.—A merchant, aged about 35, subject to rheumatism, came under my charge at the height of an attack of that disease. Almost every joint was swollen and extremely painful. Under treatment this all very soon got well, with the exception of one of the knee joints. This one joint resisted all treatment. The synovial sac was distended by a considerable amount of effusion. I applied a blister, and prescribed other treatment, but with no effect. One day I expressed my surprise that this one joint gave so much trouble, and the patient told me that it had troubled him for over nine years; that, during all that time he had been subject to attacks of pain and swelling limited to that one joint, and laying him up for weeks. This was the very first case of effusion in the synovial sac in which I used the elastic bandage, and was before I was entirely familiar with its use and effects in such cases. There was an open blister over the head of the tibia, and in my ignorance I did not like to apply the bandage till that was healed. I removed by aspiration 5x of synovial fluid. In ten days the sac was more distended than before, and the blister closed. I again aspirated the sac, which yielded 5xiiij of pure synovia, and applied the bandage. The man was up and about in three days. He wore the bandage night and day for three months, and has since (over four years) been entirely free from trouble in the knee. I have treated several cases of effusion in the synovial sac since that case in precisely the same manner, and with invariable success. In none of these cases has there been any return of the undue effusion if the bandage was properly applied for a sufficient length of time after the aspiration of the joint. It is very important in these cases that the patient should perfectly understand that the bandage must be worn *night and day* for at least six weeks. If the bandage is left off one day effusion may again distend the sac, and the aspiration have to be repeated. I have had two or three cases fully illustrative of the importance of this caution. One patient had 5ix of synovia removed and the bandage applied to the knee. I visited him again in a week, found that he had misunderstood my directions how to apply the bandage; it had become loosened and had not been reapplied, the sac had refilled; I aspirated 5xix, and hammered into the fellow's head the simple lesson of applying the bandage, and, when I again saw him, three months after, his knee was quite well.

Disease of Bursæ Mucosæ.—I have treated seven cases of what is called "housemaid's knee," by thoroughly evacuating the unusually distended bursa mucosa and at once applying the bandage, to be worn, *day and night*, for a month. No other treatment was used, and the results were, in every case, successful. One case of enlargement of the bursa patellæ was treated in the same way with success.

Edema and Anasarca.—I have treated many cases of anasarca and edema of the leg with the rubber bandage. By its use, inordinate effusion into the cellular tissue, with its many inconveniences, may be prevented, and, when present, it may be rapidly diminished during the application of the bandage. Of course, in many cases, such application of the bandage is merely palliative. In two cases, that edema of the arm which is one of the miseries accompanying the latter stages of cancer of the breast has been moderated and almost removed while the bandage was applied.

Erysipelas and Erythema.—I have used the bandage in three cases of these affections of the leg, with the effect of at once arresting the disease, mechanically expelling the blood from the congested capillaries, and, as it were, extinguishing the *fire* (*Ignis Sancti Anthonii*) by depriving it of fuel, so rapid and complete was the result.

Cutaneous Affections.—I have also used it, with great success, in several cases of various forms of inflammation and the results of mal-nutrition of the skin, to which very learned words, of sesquipedalic length and Greek derivation, are applied in the jargon of dermatology. In every case of cutaneous disease, however named, dependent on imperfect nutrition due to unequal and defective circulation, I should not hesitate to use this means, with confident expectation of good results.

Injuries of the Bones.—I have made use of the bandage in two cases of the rare injury entitled "green-stick" fracture, both of bones of the forearm in children. The gentle, constant pressure, attained by applying it over a splint, gradually accomplished a perfect reduction of the fracture and removal of deformity, which I had been quite unable to do by persistent manipulation.

I have used it in three cases, two in the arm and one, now under treatment, of the leg, to straighten out a bad union of recent fractures, and have succeeded thus in gradually rectifying deformity for which there seemed no remedy but re-fracture.

Rheumatism and Neuralgia.—The application of bands of thin rubber to joints and parts of the body affected with certain forms of rheumatism and neuralgia is not new, but I think that the use of a *strong* bandage of the same material, capable of exercising graduated and continued pressure on joints and portions of the limbs affected in this manner, is original with myself. There is no doubt that often chronic pain is the result of effused products of disease, pressing on nervous branches and interfering more or less with the innervation of parts. The constant warmth, moisture, and, above all, pressure produced by the bandage have a most undoubted effect, not only immediately in the manner of a poultice, but permanently by bringing about a rapid and complete absorption of morbid deposits. Whatever the theory of relief in these cases, I have treated so many rheumatic and neuralgic joints with the most gratifying, immediate, and permanent results that I can have no doubt whatever of the value of the method. I have found the elastic bandage a very useful temporary surgical dressing after the reduction of certain dislocations of the joints, particularly of the elbow, preventing entirely the tendency to return of displacement, and at the same time permitting use of the limb. I have before alluded to its use in subluxations and their sequelæ.

In Varicose Veins, as a Substitute for the Laced Stocking.—In a previous part of this paper I have, very fully, alluded to the use of the strong elastic bandage for ulcers of the leg complicated with a varicose condition of the veins, and also of the importance of wearing the bandage in such cases, *after* cure of the ulceration, for relief of symptoms of the disease of the veins, but more particularly as a preventive of the return of the ulcer. From all this it will be naturally inferred that I also use the bandage in cases of varicose veins of the leg where no ulcer exists. As a substitute for the familiar "*laced stocking*," I have found the rubber bandage very useful in the palliative treatment of varicose veins. The laced stocking, if very well made, and accu-

rately fitted, affords great comfort and relief, by supporting the weakened walls of the diseased vessels and preventing their distension and the consequent pressure on nervous branches which produces so much and often such extremely distressing aching pain. The laced stocking, however, becomes every day less and less of a support, and in order to obtain all the relief it is capable of affording, it has to be frequently renewed, and, as each stocking is very expensive, the annual outlay is considerable even for comparatively wealthy patients, out of the question for the poor. The expense of a rubber bandage is not more than one-fourth or fifth of that of a *silk* laced stocking, and no other is worth having. It may, with care, be constantly worn for two to even four years, and afford as perfect a support, so long as it holds together, as it did on the first day of its application.

There are two objections to its use, which may be alleged: one, the constant and often profuse perspiratory moisture under the bandage, and "chafing" of the skin.

The annoyance from the profuse perspiration may be very much modified by wearing a linen or cotton or thin woollen (as of bunting) bandage next to the skin. A bandage of thin rubber perforated in the manner of card-board and "porous" plasters, has been recommended and employed in the palliative treatment of varicose veins. This is too weak to afford a sufficient degree of support, except for patients of inactive and sedentary life and habits. The perforations render the bandage very liable to be torn and so rendered useless, and do *not* accomplish the end aimed at, of affording a means of escape for the moisture. Besides this, they have a very great drawback; the skin is pushed into each of the little holes in the rubber, and each of these minute herniæ becomes the seat of congestion and possible inflammation. I have seen one case in which each of the little tumors became an angry suppurating pimple. Such a bandage might be worn over a cloth "roller," but would be found to possess no advantages whatever in diminishing the amount of perspiration, over one without perforation. The *chafing* which many people dread and expect from the use of a rubber bandage is very seldom found to offer any serious objection to its use. I have, in a very large experience, for over twenty, nearly twenty-five, years, found but three or four cases in which the patient's skin could not endure the immediate contact of the rubber. In

a few cases the skin is somewhat irritated by the maceration and removal of the outer and effete layer of epidermis, but it very soon becomes habituated, as it were, to the new application, and is invariably in a very much healthier and quite unobstructed condition after a fortnight's use of the bandage than previous to its application. I have many poor patients wearing the bandage, continually, as a palliative of the symptoms of varicose legs, who are quite unable to bear the expense of laced stockings, and who are enabled to attend to their daily labor with comfort and without interruption. I have also patients wealthy enough to afford laced stockings of the best description, and who wore such for years, who have abandoned them and now wear the rubber bandage exclusively.

Conclusion.—There are other applications which I have made of the bandage (as, for instance, with a compress over the track of a long sinus in the forearm), and others which I might suggest, but this paper has already far exceeded, unavoidably, what I expected at its commencement, and I will occupy my reader's time and my own but a moment longer. I have written enough to indicate the way in which the strong elastic bandage accomplishes very desirable results, and some of the applications of it.

I am sure, from my own experience, that my readers will find it a very valuable means for the attainment of very important ends; and I doubt not that their ingenuity will suggest many applications of it which, in all my long experience in its use, have not yet occurred to me.

Postscript.—In order that physicians may be able to obtain these bandages, properly made, I have made arrangements with Messrs. T. Metcalf & Co., 39 Tremont St., and Messrs. Leach & Green, 1 Hamilton Place, Boston, by which they will be supplied, from the same manufacturer who has always supplied me, with an ample stock of bandages, ready for use, not only for the leg, but of the varying length, thickness, and width required for exceptional cases and for the joints, and also the bandaging, so that surgeons can have any length they require. The bandages supplied by these gentlemen will be precisely such as I use, made by the person who has always made them for me, and will be all inspected by myself. If there should arise any demand for

these bandages, there will, of course, be sharp and possibly not over-scrupulous competition in their production and sale. I hope, however, that if made and sold by others than those named above they will be of equal excellence, for I should regret extremely to have any physician disappointed and perhaps blaming me for results properly to be laid to the account of an ill-made bandage.

The preceding paper was hastily prepared amid the press of numerous and distracting occupations and engagements, and is by no means so complete as I could wish, or as the practical importance of its theme seems to me to merit. As an opportunity is unexpectedly offered, I wish to say a few words of the use of the strong elastic bandage as a means of effecting the *radical* cure of varicose veins of the leg, and of affording infinite immediate relief, and averting great possible permanent lesion, in that common form of venous engorgement sometimes of both, but usually of one of the lower extremities of pregnant women. The application of the bandage affords perfect relief from the very wearing aching pain which accompanies the latter complication, and, if worn for the entire term of pregnancy, the tendency to a permanent dilatation and varicose condition of the veins is obviated. When I apply a bandage in one of these cases, I advise the patient to wear it always, while on her feet, till her confinement, and, after that, to carefully preserve it, and, in case of future pregnancy, to re-apply it as soon as the first indication of venous engorgement occurs. Many of my patients have thus worn a single bandage through several successive pregnancies.

I have already written, at some length, of the use of the bandage as a very effectual means for the *palliative* treatment of varicose veins of the leg, but nothing of the effect of long-continued pressure in accomplishing the *radical* cure of this extremely common and most distressing infirmity. I have long entertained a theory that the sort of pressure afforded by the bandage, if continued for a long period, might effect radical cure in these cases, and had, when the body of this paper was written, observed some facts tending to confirm this theory. These facts were not, how-

ever, sufficiently conclusive to induce me to "broach" my theory at that time. A very large proportion of my cases are only seen once by me. They come from distant places, and, except in a very few instances, I never see them after the first application of the bandage, nor, beyond information of the cure of ulcers, do I often hear any particulars of the results of treatment. Since writing the paper, however, a very striking case has come under my notice, illustrating the effect of the constant use of the bandage for a long time in the perfect cure of varicose veins, so striking that I no longer entertain the slightest doubt of the truth and soundness of my theory. I will briefly narrate the case.

Somewhat over two and a half years since, I was requested to visit a woman residing at a place some twenty miles distant. She was suffering from ulceration of both legs, and was quite unable to visit me, was, in fact, bed-ridden, and had been so for several weeks. I found a somewhat corpulent woman, aged sixty-five, with an extremely varicose condition of both legs below the knees. On one leg was an enormous ulcer nearly as large as the hand; on the other side were two ulcers, one of which was about half that size, and the other a little larger; much of the skin not occupied by the ulcers was in a dark, livid, unsound condition, and the entire cutaneous surface was in a dry, scurfy, ill-nourished state. I need not enter into any detailed account of the case. It was simply a very bad one of an extremely common form of disease. For over eight years the patient had suffered continually from ulceration of the legs, and, for a much longer period, from the varicose disease. She was, just before I saw her, and had been for over a year, under the care of a *soi-disant* homœopathist. His remedies and applications had been by no means homœopathic, but had been employed with more zeal than knowledge, and had resulted in nothing but an aggravation of all her symptoms. She had, however, been previously in the care of other physicians, and had received no permanent benefit from treatment. This was a very exceptionally bad case. The extent and character of the ulceration and of the varicose disease were so great and aggravated, that I gave a much more "guarded prognosis" than I generally give in these cases. Her son wrote me every few days in regard to the case, accompanying his reports with outlines of the changing shape and diminishing size of the ulcers. I need not detail the steps towards recovery, but will simply state that in a little less than

twelve weeks the final report notified me of the entire closure of the last ulcer.

About a month since this old lady came to see me, and I examined her legs with great interest. The skin was perfectly healthy, free from the slightest eruption or scurfiness, as soft and smooth as that of a perfectly healthy infant. Scars of not more than two-fifths of the size of the ulcers, perfectly smooth, and only distinguishable, at first sight, from the rest of the surface by their greater whiteness, remained; the dark livid color had entirely disappeared, and also every trace of the varicose condition of the veins in both legs. When I first saw her there was, in the course of the internal saphenous vein of each leg, in the usual position, on the inside and below the knee, an unusually large tumor composed of extremely varicose and tortuous veins, and the usual smaller masses of the same sort observed in aggravated cases. When I saw her, one month since, the only relics of these were slight traces, only discoverable by careful tactile examination, of the two larger *varices*. This is but one case, but so extreme a case of varicose disease, and such a clear and perfect result, evidently of nothing but constantly and long applied pressure, that I think the impartial reader will agree with me that it goes far towards proving, if it indeed does not entirely prove, that such long-applied pressure may be considered a valuable means to even the radical cure of varicose disease of the superficial veins of the leg. It would seem that in this case, the long-continued even pressure, never relaxed while the patient was in that upright position in which alone there is any tendency to undue venous distension, and the continual apposition of the internal walls of the diseased vessels to each other, had, at last, resulted in a complete obliteration of them *as vessels*, and accomplished precisely what is done in successful treatment by the far from safe or invariably successful operation by ligature or the potential cautery. However the result was attained, of its thoroughness in this one case there can be no doubt whatever. The patient had, while in the erect position, worn bandages on both legs for very nearly two and a half years, and in illustration of what I have written of the durability of these bandages, if properly made, I may state that they were both in perfect preservation, as good, to all appearance, as on the day they were first applied. Indeed, I gave her a pair of new bandages for

them, as I wished to possess them as specimens and illustrations of this great durability.

Since my remarks at Chicago I have sent bandages to several gentlemen who were present there, and from two of these I have already received reports of very successful results from their use in cases of ulcer. I sincerely hope that other practitioners who may employ this method will publish their results, or, if they do not wish to do this, that they will communicate them to me with a view to publication, as I am very desirous that the merits of the treatment I recommend may be made evident by the results obtained by others beside myself, who may, of course, be open to the usual suspicion of undue partiality for a method peculiarly my own.

HENRY A. MARTIN.

